

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 04 APR 2005

WIPO PCT

Applicant's or agent's file reference 9533WO/NW/MZ	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/SE2004/001040	International filing date (day/month/year) 24-06-2004	Priority date (day/month/year) 26-06-2003
International Patent Classification (IPC) or national classification and IPC B25J 17/02		
Applicant ABB AB ET AL		

- This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 5 sheets, including this cover sheet.
- This report is also accompanied by ANNEXES, comprising:
 - ☐ (sent to the applicant and to the International Bureau) a total of _____ sheets, as follows:
 - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input checked="" type="checkbox"/> | Box No. VIII | Certain observations on the international application |

Date of submission of the demand 25-01-2005	Date of completion of this report 15-03-2005
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88	Authorized officer Ender Dag /ITW Telephone No. +46 8 782 25 00

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/SE2004/001040

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

- ☒ the international application as originally filed/furnished
- ☐ the description:
- pages _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ the claims:
- pages _____ as originally filed/furnished
- pages* _____ as amended (together with any statement) under Article 19
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ the drawings:
- pages _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-32</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-32</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-32</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Reference is made to the following documents:

D1: US 4 690 012 A
D2: US 4 708 580 A
D3: EP 0 631 853 A1

Document D1 discloses a robot wrist for use with an industrial robot. The wrist comprises three independently rotatable wrist parts arranged in series with each other. The wrist contains a protection hose in a hollow structure and axis of rotation for gear members to drive movements between the first, second and third wrist parts. The joint and gearing between the meshing gear pair of a first and a second wrist part is inclined to cause coordinated rotation there between (see whole document).

Document D2 discloses a three-axis wrist mechanism with three independent rotational axes. A first pair of the axes has a first point of mutual intersection and a second pair of the axes with a second point of mutual intersection offset from the first point. Bevel gear means are provided for independent rotation of the wrist mechanism in relation to the mutual intersections (see whole document).

Document D3 discloses a robot wrist for use with an industrial robot arm. The wrist is independently rotatable in three axes in series with each other driven by a gear mechanism (see whole document).

The invention according to claims 1-32 differs from what is known in D1-D3 by the redesigned gear wheel set-up for a robot

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: BOX V

wrist. At least one of the gear members is arranged with a positive convex- and a negative concave bevel gear relative to a plane of rotation perpendicular to the rotation axes of the gear member. The difference between D1-D3 and the claimed invention is the change of design and arrangement of the gear wheels, which provides a wrist that is compact overall and thereby increases the possibilities to reach into more difficult spaces by the robot arm. The change of the gear arrangement increases the diameter inside the hollow passage inside the wrist sections, which leaves more freely room inside for protection hose to bend and flex. The gear mechanism makes the wrist more compact and maintains flexibility for inner protection hose through the wrist. The teaching of the prior art as disclosed in the cited documents does not lead a skilled person to the invention. Therefore, the invention defined in the claims is not obvious to a person skilled in the art.

The invention according to claims 1-32 is thus novel and is considered to involve an inventive step. The invention also has industrial applicability.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

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Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

In claim 1 the reference "yes" is not indicated with clarity for the technical feature of the invention. Therefore, the reference should be deleted.

The reference value "0" is inconsistency as a negative bevel angle, according to the determination of claim 1. Therefore, the reference "0" in claim 3 is contradictory to the referred and dependent invention of claim 1. Further, claim 3 defines the negative bevel angle in a range between "0..-20 degrees". The description does not mention or specify any embodiment of a technical feature related to the claimed range interval. It is not considered obvious and clear for the negative bevel angle to lie in a range interval from 0..-20 degrees. Therefore, claim 3 shall be removed.

The references for drawings 6a and 6b are inverted according to the description. The references and technical feature in description and drawings concerning "figures 6a and 6b" should be adjusted to the statement which it refers to.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 2004/001040

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B25J 17/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B25J, F16H, B23P

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4690012 A (H.DAHLQUIST ET AL), 1 Sept 1987 (01.09.1987), whole doc. --	1-32
A	US 4708580 A (H.A.AKEEL), 24 November 1987 (24.11.1987), whole doc. --	1-32
A	EP 0631853 A1 (ASEA BROWN BOVERI AB), 4 January 1995 (04.01.1995), whole doc. -- -----	1-32

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

30 Sept. 2004

Date of mailing of the international search report

11-10-2004

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Swedish Patent Office

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INTERNATIONAL SEARCH REPORT

Information on patent family members

03/09/2004

International application No.

PCT/SE 2004/001040

US	4690012	A	01/09/1987	DE	3431033	A,C,R	21/03/1985
				FR	2551390	A,B	08/03/1985
				GB	2147877	A,B	22/05/1985
				GB	8422086	D	00/00/0000
				IT	1179038	B	16/09/1987
				IT	8453725	V	10/08/1984
				IT	8467805	D	00/00/0000
				JP	1743607	C	15/03/1993
				JP	4026995	B	08/05/1992
				JP	60150990	A	08/08/1985
				SE	454659	B,C	24/05/1988
				SE	8304726	A	02/03/1985

US	4708580	A	24/11/1987	CA	1245691	A	29/11/1988
				DE	3601456	A,C	24/07/1986
				JP	1765462	C	11/06/1993
				JP	4046720	B	30/07/1992
				JP	61168487	A	30/07/1986

EP	0631853	A1	04/01/1995	DE	69408497	D,T	24/09/1998
				ES	2115104	T	16/06/1998
				JP	7148688	A	13/06/1995
				SE	513348	C	21/08/2000
				SE	9302288	A	03/01/1995
				US	5761965	A	09/06/1998